

We Claim:

1. A spring-action suction head, comprising:

a first suction chamber having a volume for lifting the spring-action suction head and the volume being varied by applying a vacuum; and

a second suction chamber coaxially surrounding said first suction chamber for holding the spring-action suction head and for reducing a lowering speed of the spring-action suction head.

2. The spring-action suction head according to claim 1, further comprising a controlled vacuum supply fluidically communicating with said second suction chamber.

3. The spring-action suction head according to claim 1, further comprising an adjustable cross-flow channel and said second suction chamber is operatively connected to said adjustable cross-flow channel.

4. The spring-action suction head according to claim 3, wherein said adjustable cross-flow channel has an adjustable length.

5. The spring-action suction head according to claim 4, further comprising a lifting cylinder delimiting both said first suction chamber and said second suction chamber.
6. The spring-action suction head according to claim 5, wherein said lifting cylinder has at least one non-return valve.
7. The spring-action suction head according to claim 6, wherein said non-return valve is disposed in a through opening between said second suction chamber and atmosphere.
8. The spring-action suction head according to claim 2, further comprising dedicated rotary valves including a first rotary valve connected to said first suction chamber and a second rotary valve connected to said second suction chamber.
9. The spring-action suction head according to claim 8, further comprising an adjustable restrictor and said second rotary valve is connected to atmosphere through said adjustable restrictor and it is thus possible to ventilate said second suction chamber through said adjustable restrictor.
10. The spring-action suction head according to claim 5, wherein:

said adjustable cross-flow channel has a bore formed therein and disposed axially parallel to said lifting cylinder; and

said second suction chamber has at least one opening formed therein connecting said second suction chamber to said bore of said cross-flow channel.

11. The spring-action suction head according to claim 10,

further comprising a closing element disposed in said bore of said adjustable cross-flow channel, said bore having an operable length being adjusted by a position of said closing element in said bore; and

wherein said opening in said second suction chamber being one of a plurality of openings connecting said second suction chamber to said bore, and said closing element determining a number of said openings being available for fluidically communicating between said second suction chamber and said bore.

12. A spring-action suction head, comprising:

a lifting cylinder; and

a housing supporting said lifting cylinder, said housing defining a first suction chamber having a volume for lifting said lifting cylinder and the volume being varied by applying a vacuum and a second suction chamber coaxially surrounding said first suction chamber for holding said lifting cylinder and for reducing a lowering speed of said lifting cylinder.

13. The spring-action suction head according to claim 12, further comprising a controlled vacuum supply fluidically communicating with said second suction chamber.

14. The spring-action suction head according to claim 12, wherein said housing has an adjustable cross-flow channel formed therein and said second suction chamber is operatively connected to said adjustable cross-flow channel.

15. The spring-action suction head according to claim 14, wherein said adjustable cross-flow channel has an adjustable length.

16. The spring-action suction head according to claim 15, wherein said lifting cylinder delimits both said first suction chamber and said second suction chamber.

17. The spring-action suction head according to claim 16, wherein said lifting cylinder has at least one non-return valve.

18. The spring-action suction head according to claim 17, wherein said non-return valve is disposed between said second suction chamber and atmosphere.

19. The spring-action suction head according to claim 13, further comprising dedicated rotary valves including a first rotary valve connected to said first suction chamber and a second rotary valve connected to said second suction chamber.

20. The spring-action suction head according to claim 19, further comprising an adjustable restrictor and said second rotary valve is connected to atmosphere through said adjustable restrictor and it is thus possible to ventilate said second suction chamber through said adjustable restrictor.

21. The spring-action suction head according to claim 16, wherein:

said adjustable cross-flow channel has a bore formed therein and disposed axially parallel to said lifting cylinder; and

said second suction chamber has at least one opening formed therein connecting said second suction chamber to said bore of said cross-flow channel.

22. The spring-action suction head according to claim 21,

further comprising a closing element disposed in said bore of said adjustable cross-flow channel, said bore having an operable length being adjusted by a position of said closing element in said bore; and

wherein said opening in said second suction chamber being one of a plurality of openings connecting said second suction chamber to said bore, and said closing element determining a number of said openings being available for fluidically communicating between said second suction chamber and said bore.